Feb. 28, 1933. L. E. HOWARD 1,899,463

METHOD OF AND APPARATUS FOR GRINDING AND POLISHING MATERIALS

Filed March 26, 1930

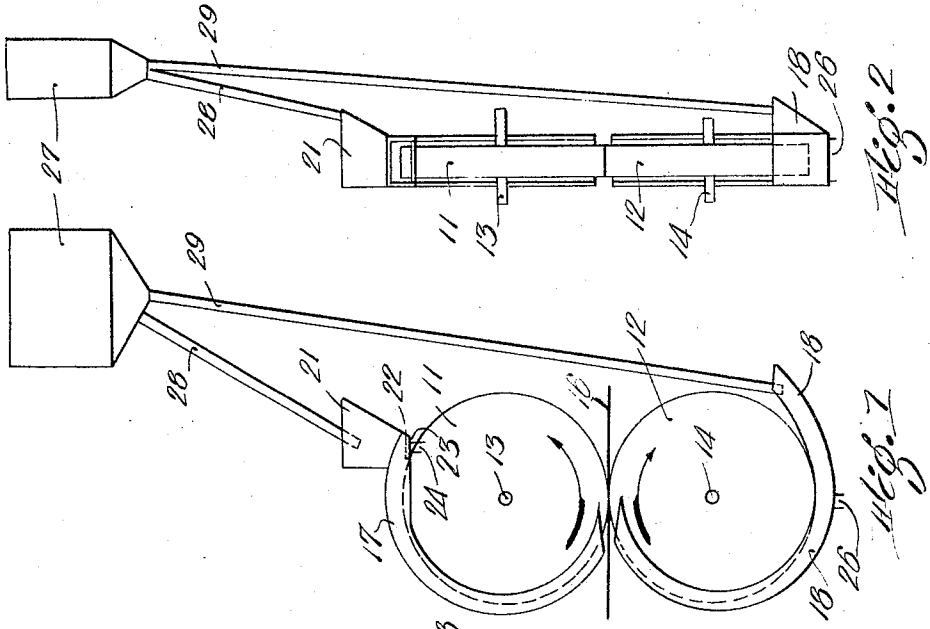


Fig. 2

Fig. 1

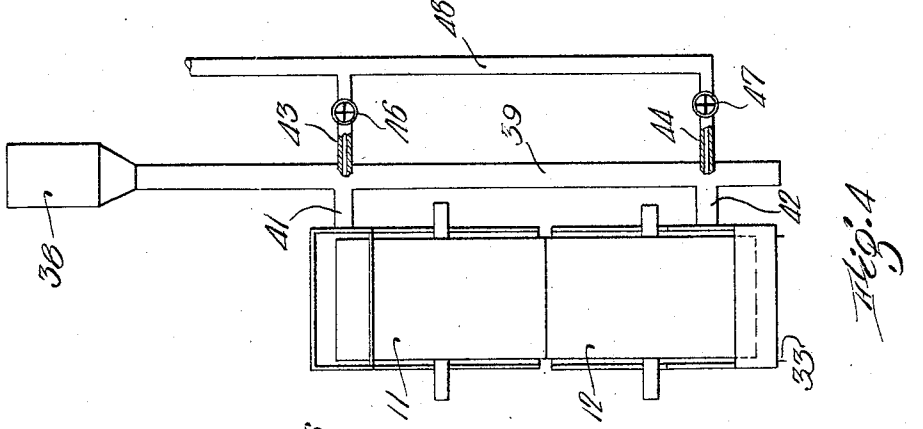


Fig. 4

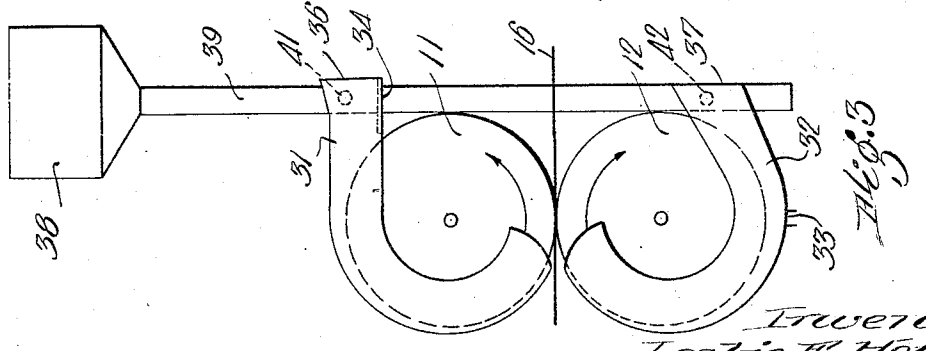


Fig. 3

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR GRINDING AND POLISHING MATERIALS

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This invention relates to the art of abrading and polishing, and to means for supplying and for distributing abrasive over polishing wheels.

Abrading wheels known as dry polishing wheels are distinguished from others by the fact that the abrasive material is not glued or otherwise affixed to the face of the wheel, but loose abrasive is supplied as a powder between the wheel and the surface being treated. When the abrasive is supplied in proper quantities and uniformly distributed across the face of such a wheel the work is more uniform and in general more satisfactory than that obtainable with other types of wheels having abrasive surfaces which deteriorate with use. Heretofore it has been very difficult to effect a good distribution of abrasive even over the face of a wheel operating on the upper surface of a piece of stock, while it has been practically impossible to effect proper control and distribution of abrasive over a wheel operating on an under or bottom surface. Due to these conditions it has been impossible with dry polishing wheels simultaneously to produce the same abrading action on the upper and lower surfaces of a piece of stock.

Objects of this invention are to improve the art of supplying and distributing abrasive over the face of a wheel; to provide for conveying abrasive either upwardly or downwardly about the face of a wheel in the direction of rotation; to provide for simultaneously and uniformly polishing or otherwise abrading both the upper and lower surfaces of a piece of stock; to provide apparatus for these purposes of rugged and durable and yet simple and efficient construction, consisting of new parts which are also relatively inexpensive to manufacture; and also to provide apparatus of this character having an improved construction and arrangement of parts.

In the drawing:

Figs. 1 and 2 are respectively diagrammatic side and end views of one embodiment of the invention; and

Figs. 3 and 4 are respectively diagrammatic side and end views showing another embodiment of the invention.

In Figs. 1 and 2, upper and lower polishing wheels 11 and 12 are mounted upon arbors 13 and 14 which are supported for rotation in bearings (not shown) in the usual manner. These wheels are spaced to receive a piece of stock 16 for simultaneously polishing the upper and lower surfaces of the stock, the latter being preferably moved against the travel of the wheels. Arcuate guides 17 and 18 which are preferably channel-shaped in cross section extend circumferentially about the wheels. A portion of the periphery of each wheel is disposed within the side walls of these guiding members, preferably being spaced slightly from the side walls. The guides 17 and 18 are also arranged so that the base of the channel is spaced from the face of the wheel at distances which diminish progressively around the wheel in the direction of rotation thereof. A hopper 21 is carried by the upper end of the upper guide 17 and the end portion of this guide which is beneath the hopper is closed by end and bottom walls 22, 23. An opening or slot 24 extends through the bottom wall 23 transversely across the face of the wheel 11. This slot and hopper 21 are located well to the right of the center of the wheel 11 so that under some conditions material may pass from the hopper directly through the slot and be discharged from the apparatus. The lower guide 18 has a similar slot 26 which likewise extends transversely across the face of the wheel 12 and is disposed in the lowest portion of the guide 18. Abrasive material is supplied from a hopper 27 conveniently located above the polishing wheels, and chutes or pipes 28 and 29 conduct abrasive material respectively from the hopper 27 to the hopper 21 and to the lower guide 18.

In the modification shown in Figs. 3 and 4, the upper and lower wheels 11 and 12 are arranged in the same manner as described with respect to Fig. 1 and channel-shaped guides 31 and 32 are also spaced about the wheels in the same way that the guides 17 and 18 are disposed in Figs. 1 and 2. The guide 32 has a slot 33 extending transversely across the

face of the wheel at the lowest portion of this guide. The upper guide 31 has a bottom wall 34 extending from the upper end of the guide toward the face of the wheel. The ends 36 and 37 of the guides are open. Abrasive material is supplied to the apparatus from a hopper 38 through a formation pipe 39 having a connection 41 to the side wall of the upper guide adjacent the open end 36 thereof and having a connection 42 to the side wall of the lower guide adjacent the open end 37 thereof. Air jets are formed within the formation pipe 39 by air issuing from small pipes or nozzles 43 and 44 which are effective for translating abrasive material from formation pipe through the connections 41 and 42 into the upper and lower guides. These jets are controlled by valves 46 and 47 and are supplied with air under pressure from a pipe 48.

In the operation of the apparatus shown in Figs. 1 and 2, abrasive material is permitted to descend continuously from the hopper 27 through the pipes 28 and 29 being conducted in this manner to the convergent passages formed between the guides 17 and 18, and the wheels with which these guides are associated. When these wheels are operating in the direction indicated by the arrows, the windage, that is, the friction of the face of the wheel with the air enveloping this portion of the wheel, sets up a current which is effective to distribute abrasive material transversely across the face of the wheel and also to convey this material circumferentially about the face to the surface of the stock being treated. The guide members 17 and 18 keep the abrasive material in this current, and also these members are effective due to the convergence of the passage or air duct materially to increase the velocity of the air stream as the stock is approached. This arrangement provides a good distribution and such exact control that the abrading or polishing done by the top wheel and the bottom wheel is alike. When the wheels are not operating material delivered through the pipe 28 to the hopper 21 is allowed to pass through the slot 24 and to escape from the guide 17 in this manner. This is a desirable feature as it avoids the possibility of having this material collect between the lower end of the guide 17 and the face of the wheel, for it will be apparent that such an occurrence might result in sprung arbors and general damage when the polishing wheels were started due to their being too great a supply of abrasive on the strip, and, of course, carried between the wheels. Abrasive is also permitted to escape from substantially the lowest portion of the guide 18 through the slot 26. It is found that when the polishing wheels are running at normal speed the abrasive is carried by the slots 24 and 26 and practically none falls through, while when the wheels are standing the excess abrasive falls harmlessly through the slots and, of course, does no damage.

The apparatus shown in Figs. 3 and 4 operates in the same general manner as that disclosed in Figs. 1 and 2, but in this instance abrasive descending from the hopper 38 through the formation pipe 39 is translated through the connections 41 and 42 by injecting air across the pipe 39 and through these connections. This air is preferably delivered at a comparatively low pressure and sufficient volume through the air jets 43 and 44 to effect the desired distribution transversely of the wheels. The apparatus shown in these views is especially adapted for buffing where the abrasive is extremely fine, or the wheel faces are wide, or both. It is also a valuable application where it is desired to run very wide wheels, as for example, wheels having faces 12 inches and over, with abrasives of polishing sizes as distinguished from buffing abrasive sizes. These fine abrasives tend to cake and do not flow freely as larger material will. The air jets 43 are effective in breaking up a mass of this abrasive and distributing it uniformly across the face of a wheel. By regulating the amount of air passing from the air jets with respect to the amount of abrasive falling down the formation pipe 39, just the right amount of abrasive may be distributed across the face of the end openings of the upper and lower guides, and this may be regulated so nicely that the amount of abrasive is so small and so uniformly distributed that it appears more like a fog or smoke than a stream or mass of abrasive. Once within the influence of the moving air set up by the rotation of the wheels, it is rapidly drawn into the opening between the periphery of the wheels and the corresponding part of the casings or guides and brought to its point of application precisely as described with reference to Figs. 1 and 2. It will be observed that the formation or delivery pipe 39 is disposed far enough to one side of the center of the upper wheel so that when this wheel is not revolving, such abrasive as may be blown in will drop harmlessly to a pit provided for this purpose, or a portion of it may drop into the lower casing 32 and fall through the slot 33. It will also be apparent that the delivery pipe 39 may be replaced by two pipes such as the pipes 28 and 29, as shown in Figs. 1 and 2.

I claim:

1. The combination of means providing a circumferentially extending channel, a polishing wheel with a portion of its periphery disposed within the channel, means for supplying abrasive to the channel and means effective while the wheel is stationary for discharging abrasive from the channel.

2. The combination with a polishing

wheel, of an air duct extending circumferentially about a portion of the wheel, the face of the wheel being disposed within the duct, a conduit connected to the duct for supplying abrasive thereto, and fluid jets for delivering abrasive through the conduit to the duct.

3. The combination with polishing wheels spaced for polishing the opposite sides of a piece of stock disposed therebetween, of air ducts extending circumferentially about each wheel, the face of each wheel being disposed within the duct associated therewith and spaced therefrom to define a convergent passage about the wheel, the end of each duct being open at the larger end of said convergent passage, supply conduits connected to the larger end of each of said convergent passages, and fluid translating means for delivering abrasive through the conduits to the ducts.

Signed by me at Lockport, New York, this twenty-second 22d day of March 1930.

LESLIE E. HOWARD.